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Research Article

Differences in the Impact of Traditional Long-Term Rehabilitation on Knee Function in Male and Female Stroke Patients

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Abstract

Background: The effect of gender differences on the occurrence and symptoms of stroke has always been considered and unclear. The purpose of this research is to investigate and compare the effect of a long-term traditional rehabilitation course on the knee function of women and men with stroke.

Methods: The present study was a cross-sectional study. The knee function of 10 women and 10 men stroke patients was measured at the beginning and end of two years of traditional rehabilitation programs. To compare the knee functions of two groups in the pre-test and post-test stages, the inferential ANOVA method and post-hoc Bonferroni tests were used (P≤0.05).

Results: The results showed that there is no significant difference in the average knee performance of women and men with stroke before and after long-term rehabilitation (p=0.07).

Conclusion: Maybe we can conclude that gender is not an important factor in the field of knee rehabilitation planning and its results.

Keywords: Knee function, Stroke, Gender differences

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Introduction

Stroke is considered one of the most debilitating diseases worldwide and can cause irreparable damage to the patients of this accident (1). Most past research has shown that stroke is more common in men than women, although some research has implicated other environmental conditions such as age more than gender (2).

Following a stroke, one of the most important parts of the body that may be affected and make it difficult for a person to perform daily functions is the lower limb, especially the function of the knee (3). Past research has shown that in most people with stroke, walking disorders in people with stroke may be caused by stiffness in the knee following spastic neurological disorders (4) or the injury of the knee function in these people leads to the collapsing of the gait following the muscle activity disorder in the lower limbs in these people (5). In this field, some researchers went further and investigated the effect of gender and gender differences in the amount of damage and recovery of dysfunction following stroke, lower limb, walking, and knee disorders in people with stroke (6-8). Gibson (2016) investigated gender differences on the effectiveness of treatment for people with stroke and stated that gender differences should be taken into account due to their impact on the cause of stroke and the treatment process, and due to the existence of differences such as hormonal and environmental factors, the rehabilitation of these two groups should be different (9). On the other hand, Holroyd et al. (2000) in a study showed that there was no difference in the effect of rehabilitation after stroke in men and women, and the only difference between these two groups is the cause of stroke (10). In this context, some studies have looked into detail the difference in functional recovery after a stroke in women and men, and they have acknowledged that women show a slower return to function after a stroke than men (11, 12), although some studies also acknowledged that there is no difference between the functional return of knee and gait and other cases in men and women (13). The functional return, especially the knee function in the short and long term is important in people with stroke because there are many differences of opinion regarding the gender recovery of people and the rehabilitation method of men and women after stroke (12). Therefore, the purpose of this research was to investigate the difference in the effect of conventional long-term rehabilitation on the knee function of women and men with stroke.

Methods

This study was a cross-sectional study with a pre-test-post-test design. Male and female stroke patients who were referred to the rehabilitation clinic by a neurologist were used as subjects. To enter the study, the patients were over 60 years old and no more than one year had passed since their stroke. Exclusion criteria included any cognitive, or sensory disorders, history of fracture, or surgery, Unwillingness to continue participating in the research. After a complete explanation of the research implementation process for the subjects, the patients signed the written consent form, and the protocol of this study was approved by the Ethics Committee of the

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20 male and female stroke patients were selected based on the inclusion and exclusion criteria of the study using the available sampling method to conduct the research with a double-blind method and were divided into two groups of men and women, including 10 women and 10 men.

All patients were examined at the beginning and in the pre-test examination stage and their knee function was examined and their scores were recorded. All evaluation stages and rehabilitation sessions were performed by an occupational therapy specialist. After two years of the treatment period and with the end of the rehabilitation sessions of the two groups, the patients were examined to perform the post-test stage to evaluate the knee function (17). All rehabilitation procedures were performed by a certified occupational therapist. Traditional rehabilitation methods in this study included conventional functional and neuromuscular techniques, including limb stretching, passive mobilization of joints, walking between parallel bars, and occupational therapy (17,18).

Knee function was examined by the WOMAC test (McMaster University Arthritis Index) (14). The WOMAC takes approximately 12 minutes to complete. The test questions are scored on a scale of 0-4, which corresponds to: none (0), mild (1), moderate (2), severe (3), and extreme (4). The scores for each subscale are summed up, with a possible score range of 0-20 for Pain, 0-8 for Stiffness, and 0-68 for Physical Function. A sum of the scores for all three subscales gives a total WOMAC score. Higher scores on the WOMAC indicate worse pain, stiffness, and functional limitations (14). After the pre-test stage, patients of both groups used conventional upper and lower limb rehabilitation for one year, 5 sessions a week. Each rehabilitation session of these patients lasted about 60 minutes. The rehabilitation protocol for these people generally included rehabilitation methods (15-18). Traditional rehabilitation methods in this study included conventional functional and neuromuscular techniques, including limb stretching, passive mobilization of joints, walking between parallel bars, and occupational therapy.

Statistical Analysis

SPSS software model 22 was used for statistical analysis. Descriptive statistics including mean and standard deviation were estimated in two groups. The Shapiro-Wilk test was used to evaluate the normal distribution of the data, and to compare the two groups of men and women in the pre-test and post-test stages, the inferential ANOVA method and Post-Hoc Bonferroni tests (power= 0.8) were used ($P \leq 0.05$).

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Results

The results of descriptive statistics related to the subjects' characteristics are shown in Table 1.

Table 1. Descriptive statistics results of subjects' characteristics (Mean±SD)

Groups	Age (yrs.)	BMI (kg/m^2)	CVA Background (Month)	Pre- WOMAC (Score)	Post- WOMAC (Score)
Male	60.5±17.75	29.46±4.09	9.1±3.6	40.40±13.40	38.84±12.90
Female	63.7±9.56	28.58±5.83	8.6±2.31	35.99±11.61	34.58±11.27

The results of the Shapiro-Wilk test indicated the normality of the data distribution. Also, the results of inferential statistics are shown in Table 2. The results of the ANOVA (table 2) and Post-hoc Bonferroni tests showed, that there is no significant difference between the mean of the WOMAC test in the pre-test and post-test stages between the two groups of men and women with CVA.

Table 2. The results of the ANOVA test

		Sum of Squares	df	Mean Squares	F	Sig
Groups	**Between Groups**	210.51	3	70.17	0.46	0.71
	Within Groups	5474.36	36	152.06		
	Total	5684.88	39			

*P≤0.05

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Discussion

The purpose of this research was to investigate the difference in the effect of conventional long-term rehabilitation on the knee performance of women and men with stroke and the results showed that there is no significant difference in the average knee performance of women and men with stroke before and after long-term rehabilitation. Disruption of knee function in stroke patients and its recovery has always been the focus of rehabilitation and medical researchers (19, 20). Extensive research has investigated this disorder and its relationship with other activities of people with stroke (21, 22). Also,

some researchers have investigated the effect of gender differences on the usefulness of rehabilitation for stroke patients (23), but few studies have exclusively investigated the effect of rehabilitation on the knee function of stroke patients by emphasizing gender differences (24). Tomita et al. (2015) investigated the effect of gender differences on the performance of people with stroke and found that the female gender is a risk factor for the functional results of stroke rehabilitation (12). Perhaps one of the reasons for this inconsistency is that in their study, people with stroke were examined in the first 48 hours after the onset of the disease, but our study performed a long-term functional assessment of the knee after one year of rehabilitation.

In a study similar to ours, Acciarresi et al. (2014) examined the effect of gender on the symptoms of stroke patients and reported that gender did not affect the functional clinical results of these patients and only women may suffer more dysphagia than men (13). Also, in another study, Fukuda et al. (2009) analyzed the long-term functional status in both men and women with stroke, and in inconsistent results, they stated that 1 and 5 years after the stroke, women performed much lower than men (25). Probably one of the reasons for this disparity is that in their study the effects of rehabilitation and being under the control of the patients in terms of treatment conditions were not affected and the main focus in their study was only the difference in the cause of the stroke, but in our study, the patients sought a conventional rehabilitation course with an emphasis on recovery was investigated. Adegoke et al. (2003) also examined the relationship between gender and motor function of stroke patients and in a consistent study with us concluded that the motor function of women and men after stroke rehabilitation is not different (26).

One of the main limitations of our study was that due to the long examination process, the number of available samples was very small in both groups of women and men, and it was only possible to examine knee function based on the gender of these patients. Therefore, it is recommended that future studies consider more samples and tests for their research.

Conclusion

The results of the research showed that there is no significant difference in knee performance in men and women following a long-term rehabilitation period, and gender is not an important factor in the field of rehabilitation planning and its results. Therefore, rehabilitation of stroke patients should be based more on treatment methods than on the patient's gender.

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Authors contribution:

All authors (RYM, TH, and RK) contributed to the study conception and design. Data collection by TH, RK, and analysis was performed by RYM. The first draft of the manuscript was written by RYM and all authors commented on the manuscript. All authors read and approved the final manuscript.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Disclosure statement

The authors declared no conflict of interest.

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REFERENCES

1. Luchian M, Săceleanu A. Haemorrhagic Cerebrovascular Accident (CVA) Etiology and Case Report. Acta Medica Transilvanica. 2020;25(4):16-8.

2. Rajati F, Rajati M, Rasulehvandi R, Kazeminia M. Prevalence of stroke in the elderly: a systematic review and meta-analysis. Interdisciplinary Neurosurgery. 2023;32:101746.

3. Geerars M, Minnaar-van der Feen N, Huisstede BM. Treatment of knee hyperextension in post-stroke gait. A systematic review. Gait & Posture. 2022;91:137-48.

4. Li S. Stiff knee gait disorders as neuromechanical consequences of spastic hemiplegia in chronic stroke. Toxins. 2023;15(3):204.

5. XU H, HU G, ZHENG S, ZENG X, ZENG X, SHAO W. Correlation between knee hyperextension gait and lower limb muscle activation in stroke patients with hemiplegia. Chinese Journal of Rehabilitation Theory and Practice. 2023:151-5.

6. Abdel-Fattah A-R, Pana TA, Smith TO, Pasdar Z, Aslam M, Mamas MA, et al. Gender differences in mortality of hospitalised stroke patients. Systematic review and meta-analysis. Clinical Neurology and Neurosurgery. 2022;220:107359.

7. Poggesi A, Insalata G, Papi G, Rinnoci V, Donnini I, Martini M, et al. Gender differences in post-stroke functional outcome at discharge from an intensive rehabilitation hospital. European Journal of Neurology. 2021;28(5):1601-8.

8. Carcel C, Woodward M, Wang X, Bushnell C, Sandset EC. Sex matters in stroke: a review of recent evidence on the differences between women and men. Frontiers in Neuroendocrinology. 2020;59:100870.

9. Gibson CL, Attwood L. The impact of gender on stroke pathology and treatment. Neuroscience & Biobehavioral Reviews. 2016;67:119-24.

10. Holroyd-Leduc JM, Kapral MK, Austin PC, Tu JV. Sex differences and similarities in the management and outcome of stroke patients. Stroke. 2000;31(8):1833-7.

11. Kim J-S, Lee K-B, Roh H, Ahn M-Y, Hwang H-W. Gender differences in the functional recovery after acute stroke. Journal of clinical neurology (Seoul, Korea). 2010;6(4):183.

12. Tomita H, Hagii J, Metoki N, Saito S, Shiroto H, Hitomi H, et al. Impact of sex difference on severity and functional outcome in patients with cardioembolic stroke. Journal of Stroke and Cerebrovascular Diseases. 2015;24(11):2613-8.

13. Acciarresi M, De Luca P, Caso V, Agnelli G, D'Amore C, Alberti A, et al. Acute stroke symptoms: Do differences exist between sexes? Journal of Stroke and Cerebrovascular Diseases. 2014;23(10):2928-33.

14. Whitehouse S, Lingard E, Katz J, Learmonth I. Development and testing of a reduced WOMAC function scale. The Journal of Bone & Joint Surgery British Volume. 2003;85(5):706-11.

15. Langhorne P, Bernhardt J, Kwakkel G. Stroke rehabilitation. The Lancet. 2011;377(9778):1693-702.

16. Murrell JE, Pisegna JL, Juckett LA. Implementation strategies and outcomes for occupational therapy in adult stroke rehabilitation: a scoping review. Implementation Science. 2021;16:1-26.

17. Hoffmann T, Bennett S, McKenna K, Green-Hill J, McCluskey A, Tooth L. Interventions for stroke rehabilitation: analysis of the research contained in the OTseeker evidence database. Topics in stroke rehabilitation. 2008;15(4):341-50.

18. Pendleton HM, Schultz-Krohn W. Pedretti's Occupational Therapy: Pedretti's Occupational Therapy-E-Book: Elsevier Health Sciences; 2024.

19. Okada K, Haruyama K, Okuyama K, Tsuzuki K, Nakamura T, Kawakami M. Categorizing knee hyperextension patterns in hemiparetic gait and examining associated impairments in patients with chronic stroke. Gait & Posture. 2024;113:18-25.

20. Flansbjer U-B, Downham D, Lexell J. Knee muscle strength, gait performance, and perceived participation after stroke. Archives of physical medicine and rehabilitation. 2006;87(7):974-80.

21. Kostka J, Czernicki J, Pruszyńska M, Miller E. Strength of knee flexors of the paretic limb as an important determinant of functional status in post-stroke rehabilitation. Neurologia i Neurochirurgia Polska. 2017;51(3):227-33.

22. Tütüneken YE, Yeldan İ. Relation of functional independence to balance, exercise capacity, and peripheral muscle strength in individuals with chronic stroke: A cross-sectional study. Journal of Bodywork and Movement Therapies. 2024;40:1514-9.

23. Paolucci S, Bragoni M, Coiro P, De Angelis D, Fusco FR, Morelli D, et al. Is sex a prognostic factor in stroke rehabilitation? A matched comparison. Stroke. 2006;37(12):2989-94.

24. Kirking M, Berrios Barillas R, Nelson PA, Hunter SK, Hyngstrom A. Sex differences in neuromuscular fatigability of the knee extensors post-stroke. Brain Sciences. 2017;7(1):8.

25. Fukuda M, Kanda T, Kamide N, Akutsu T, Sakai F. Gender differences in long-term functional

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outcome after first-ever ischemic stroke. Internal Medicine. 2009;48(12):967-73.
26. Adegoke BaA, OO. The relationships between gender, motor function, period since stroke and asymmetry of lower limb weight distribution post-stroke. South African Journal of Physiotherapy. 2003;59(3):15.

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